

CONCEPT MAPPING AS A TEACHING STRATEGY: BENEFITS AND CHALLENGES IN HIGHER INSTITUTION

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ABSTRACT

The study is a descriptive survey research designed to investigate concept mapping in education: benefits and challenges in higher institutions. The area of the study is the Federal college of education (Technical), Omoku. The population of the study comprises all teaching practice students in the Faculty of Science. A sample of 100 students was involved in the study. Purposive and stratified sampling technique was applied in the selection process. The Instrument used for the study to collect data from respondents is a structured questionnaire titled concept mapping in education: benefits and challenges in the higher institution (CMEBCHI) with 30-item questions. The reliability co-efficient of 0.72 was gotten. Mean and Standard Deviation were used to answer the research questions while the Z test was used to answer the hypotheses. The study found that concept maps can be used to increase learning by relating new and old knowledge and concept mapping helps students to make meaningful connections between the main idea and other information. Based on the conclusion, the researcher recommended that Teachers should use concept mapping as a useful cognitive tool for enhancing students' critical thinking by encouraging students to process information deeply for understanding

Keywords: Concept map; Constructivism, Conceptual Knowledge, visual representation

1. INTRODUCTION

The constructivism educational movement gave rise to concept maps. Concept maps show how we perceive the connections between knowledge and how we think. The instructor who creates idea maps for classrooms wants students to grasp the relationships between facts rather than just memorizing them. Concept maps can be a very effective planning tool for lessons. The value of using idea maps for creating the curriculum for a veterinary program was discussed by Edmondson [1]. By using concept maps in lesson design, students will have easier access to and integration of the material because they are efficient tools for making the structure of knowledge explicit [2]. Concept maps are diagrams that represent information visually. They can be shown as graphs, timelines, tables, flowcharts, venn diagrams, charts, visual organizers, or T-charts. Though they are beneficial for all types of learners, concept maps are particularly helpful for those who learn best visually [3]. Concept maps are an effective study technique because they enable you to see the big picture. By beginning with higher-level concepts, concept maps enable you to group material according to connections that make sense.

A method of describing knowledge or ideas as concepts and the connections between them is concept mapping. Any object, word, event, or even fact that we want to discuss can be represented as an

idea on the map. Typically, linkages between concepts are shown as oriented links between the rectangles, with arrows indicating the direction of reading. Although idea maps appear visually similar to mind maps, the visual depiction is not what makes concept mapping so important. Instead, it is the notion that knowledge should be organized into manageable chunks, that these chunks should be considered in relation to one another, and that you should attempt to connect every new piece of knowledge to something you already know [4] This second idea is derived from David Ausubel's philosophy of meaningful learning. Concept maps are much more than merely a way to visually summarize information, despite the fact that their visual character undoubtedly has many advantages, especially for so-called visual learners. When complete, a concept map can be attractive and useful for explaining complicated issues to others or for reviewing material from a previous class. The process of creating an idea map, though, is what matters most. It requires thought and effort from all involved to transform data into concepts and the connections between them [5]. Concept mappers organize information in their minds into integrated actionable knowledge through the processes of locating, choosing, identifying, and linking concepts[6].

A concept map is a graphic tool that aids in delving deeply into an idea. Diagrams force you to explore

related themes, comprehend relationships, and arrange your ideas in a logical and orderly fashion [7]. Teachers who use concept maps may observe how their students actually approach challenging material, which helps them better understand how their pupils learn. Instead of only grasping concepts on the surface, they assist students in delving deeper into subjects to realize connections between ideas [8].

Students can utilize concept maps, according to Kalliopi[9], to take notes, link new ideas to preexisting ones, or organize their thoughts and expertise in a particular field. Concept maps can help teachers take their students' knowledge of the learning process to a new level. These snapshots of a person's knowledge on a given topic can be used to evaluate states and gauge learning progress. Tools for visually organizing and displaying conceptual knowledge include concept maps[10]. They are visual representations of a group of concepts that are connected semantically. Without the limitations of linearization seen in written or verbal articulation, they enable the arrangement and correlation of ideas. According to Trevor [11], idea maps are significant for the reasons listed below:

1. Knowledge of maps fosters the development of spatial thinking: Spatial thinking is the capacity to visualize information. Students gain the ability to visualize and interpret data as they develop map skills.
2. Reading and drawing maps are two ways to exercise map skills that enable us to recognize symbols.
3. Maps open up new possibilities: In a society that seems to be becoming more disjointed, with kids feeling more alone than ever, maps might present us with a chance to venture out and explore. You can promote active learning in the classroom.

II.STATEMENT OF THE PROBLEM

Concept maps examine theories and other current systems as well as newly brought ideas and concepts. The process of breaking down a chosen concept or system into distinct subjects and relationships is known as concept mapping. A brainstorming session when a major issue is examined, broken down, and arranged into smaller relationships may resemble concept mapping. However, this process can also include knowledge modeling and assessment, system development, or a claim or argument that purposefully points out a system's flaws. When used to examine broad concepts, concept mapping can be visually overwhelming or disorganized. Users are only allowed to utilize keywords, which can produce hazy concept maps.

III. AIM AND OBJECTIVES OF THE STUDY

The aim of the study is to investigate concept mapping in education: benefits and challenges in higher institutions. Specifically, the study intends to:

1. Examine the use of concept mapping in the classroom
2. Identify the advantages of concept mapping in the classroom
3. Investigate the challenges of using concept mapping in the classroom

Research questions

1. What are the uses of concept mapping in the classroom?
2. What are the advantages of concept mapping in the classroom?
3. What are the challenges of using concept mapping in the classroom?

Hypotheses

1. There is no significant difference between male and female students on the use of concept mapping in the classroom
2. There is no significant difference between male and female students' challenges using concept map in the classroom

III.METHODOLOGY

The study is a descriptive survey research designed to investigate concept mapping in education: benefits and challenges in higher institutions. The area of the study is the Federal college of education (Technical) Omoku. The population of the study comprises all teaching practice students in the Faculty of Science, A sample of 100 students were involved in the study. A simple random sampling technique was applied in the selection process. The Instrument used for the study to collect data from respondents is a structured questionnaire titled concept mapping in education: benefits and challenges in the higher institution (CMEBCHI) with 30-item questions. The reliability co-efficient of 0.72 was gotten. Mean and Standard Deviation were the statistical tools used for the study.

IV.RESULTS AND DISCUSSIONS

Research Question 1: What are the uses of concept mapping in the classroom?

Table 1.1: Uses of Concept mapping in the classroom

S/N	Items	Mean	Standard Deviation
	Uses of concept mapping		
1.	It helps students organize new information	3.56	0.48
2.	Concept mapping helps students to make meaningful connections between the main idea and other information	3.60	0.49
3.	Concept maps are easy to construct and be used within any content area	3.40	0.49
4.	Concept maps help students see the big picture and visualize relationships	3.51	0.50
5.	Concept maps are good for processing and storing large amounts of information	3.46	0.50
6.	Through links, concept maps present information in a dynamic manner	3.51	0.50
7.	Concept maps help students develop metacognitive skills	3.55	0.50
8.	The concept map can be used to increase learning by relating new and old knowledge	3.61	0.50
9.	It helps to design students' own representations of knowledge	3.38	0.45
10.	A concept map helps organize and structure new materials.	3.28	0.42
	Average Mean	3.48	0.48

Entries in table 1.1 shows that students accepted all the item as the uses of concept maps in the classroom. This is because all the item mean was above the criterion mean of 2.50. An overall mean of 3.48 suggests that a concept map can be used to increase learning by relating new and old knowledge and concept mapping helps students to make meaningful connections between the main idea and other information.

Research Question 2: What are the advantages of Concept mapping in the classroom?

Table 1.2: Advantages of concept mapping

S/N	Items	Mean	Standard Deviation
	Advantages of concept mapping		
1.	Concept maps provide a visual representation of the links between project activities and the delivery of benefits	3.23	0.64
2.	Concept models close the gap between requirements and planning, between stating the problem and solving the problem	3.12	0.65
3.	Concept map can be used to assess students	3.10	0.66
4.	Concept map can be used in aiding the creation of a presentation	3.17	0.65
5.	Concept map allows for quick interpretation	2.88	0.64
6.	Concept maps help students to under the hierarchy of ideas, understanding how each component relates to the others	3.07	0.63
7.	Students can use concept maps to take notes	2.94	0.64
8.	Teachers can use a concept map to offer a view of students' learning process and understanding	3.05	0.68
9.	Concept map can be used as an excellent planning device for instruction	3.01	0.62
10.	Concept map can be used to analyze information and compare and contrast	3.13	0.64
	Average Mean	3.07	0.64

Entries in table 1.2 shows that students accepted all the item as the advantages of concept maps in the classroom. This is because all the item mean was above the criterion mean of 2.50. An overall mean of 3.07 suggests that concept maps provide a visual representation of the links between project activities and the delivery of benefits and concept maps can be used in aiding the creation of a presentation.

Research Question 3: What are the challenges of concept map in the classroom?

Table 1.3: Challenges of a concept map

S/N	Items	Mean	Standard Deviation
	Challenges of concept map		
1.	Sometimes relationships on concept maps become difficult to interpret	3.02	0.62
2.	A hierarchical map may discourage critical thinking, imposing a general to a specific order, discouraging reasoning skills, and offering incomplete data	3.01	0.60
3.	Concept maps or graphic organizers may offer limited benefits if instructors introduce them at the wrong times.	2.89	0.62
4.	Concept map often have to be used alongside other methods	3.08	0.65
5.	Concept map requires strong concentration skills	2.85	0.65
6.	Concept map can be overwhelming for complex subjects	3.09	0.56
7.	Students who are used to thinking at higher levels may find concept maps boring and time-consuming	3.18	0.57
8.	Evaluation is more time-consuming for the instructor.	3.24	0.69
9.	The use of concept maps makes comparative ranking of students' work difficult	3.03	0.68
10	Students who have developed strong skills for factual memorization might resist and be intimidated by concept maps that require their seeing relationships between concepts, ideas, theories, and questions	3.34	0.65
	Average Mean	3.07	0.62

Entries in table 1.3 shows that students accepted all the item as the challenges of concept maps in the classroom. This is because all the item mean was above the criterion mean of 2.50. An overall mean of 3.07 suggests that students who have developed strong skills for factual memorization might resist and be intimidated by concept maps that require seeing relationships between concepts, ideas, theories, and questions.

Hypotheses

Hypothesis 1: There is no significant difference between male and female students on the use of concept mapping in the classroom

Z test

Group	Mean	SD	N	Df	Standard Error	Z (Cal)	Z (Tab)
Boys (X1)	3.36	0.74	50	98	0.31	22.38	1.96
Girls (X2)	3.56	0.72	50				

The calculated value of Z (Cal) is greater than the tabular value, hence the null hypothesis is rejected. This means that there is a significant difference in boys' and girls' usage of concept mapping in the classroom. The girls use concept map in the classroom more than the boys, therefore X2 is greater than X1

Hypothesis 2: There is no significant difference between male and female students on the challenges of concept map in the classroom

Z test

Group	Mean	SD	N	Df	Standard Deviation	Z (Cal)	Z (Tab)
Boys X1	3.69	0.58	46	98	0.46	0.74	1.96
Girls X2	3.35	0.68	54				

The calculated value of Z (Cal) is less than the tabular value, hence the null hypothesis is accepted. This means that there is no significant difference in the challenges faced by boys and girls using concept map in the classroom.

Discussion of findings

Research Question 1: What are the uses of concept mapping in the classroom?

The result showed that concept maps can be used to increase learning by relating new and old knowledge and concept mapping helps students to make meaningful connections between the main idea and other information.

The result of this study is in agreement with those of Azarnoosh & Jila[12] who found that new knowledge is generated by a constructive cognitive process like integrating, elaborating, reorganizing, and reformatting the existing knowledge structures and linking knowledge elements with contexts and situations.

The result is also in agreement with those of Yenenesh et al [13] who found that teachers focus on making connections between concepts and foster new understanding in students by allowing, inspiring, and guiding their students on their learning path.

Research Question 2: What are the advantages of concept mapping in the classroom?

The result showed that concept maps provide a visual representation of the links between project activities and the delivery of benefits and concept map can be used in aiding the creation of a presentation.

The result of this study is in agreement with those of Aziz et al [14] who shed light on the effectiveness of concept maps and it has been found nowadays concept map is an effective teaching tool in the classroom used by teachers and its effectiveness can be measured through the prevailing learning environment, increased student participation and understanding level of students.

The result of this study is also in agreement with those of Shun-Ho [15] who found that concept maps visualize important facts, concepts, and relationships. It not only contributes to the construction and memory of knowledge, the communication, and negotiation of meaning, and the evaluation and improvement of learning results but also contributes to the organization of information and the innovation of ideas.

Research Question 3: What are the challenges of concept mapping in the classroom

The result showed that students who have developed strong skills for factual memorization might resist and be intimidated by concept maps that require their seeing relationships between concepts, ideas, theories, and questions.

The result of this study is in agreement with those of Enios et al [16] who found that there is still a long road to follow in the development of the mapping strategy. Concept mapping in higher education encourages participation and allows both teachers and students to be involved in the process of learning.

The study is also in agreement with those of Machado & Carvalho [17] who found that challenges in integrating concept mapping in academic practices such as students having difficulties in concept and link selection, students' resistance, and software difficulties.

V.CONCLUSIONS

The following conclusions were made by the researcher:

1. The study found that a concept map can be used to increase learning by relating new and old knowledge and concept mapping helps students to make meaningful connections between the main idea and other information.
2. concept maps provide a visual representation of the links between project activities and the delivery of benefits and concept map can be used in aiding the creation of a presentation.
3. students who have developed strong skills for factual memorization might resist and be intimidated by concept maps that require their seeing relationships between concepts, ideas, theories, and questions.

VI.RECOMMENDATIONS

Based on the conclusions, the researcher made the following recommendations:

1. Teachers should use concept mapping as a useful cognitive tool for enhancing students' critical thinking by encouraging students to process information deeply for understanding.
2. Teachers should identify the most general intermediate, and specific concepts.
3. Teachers should label lines with linking words in order to indicate how the concept are related.

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